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MINISTRY OF AGRICULTURE, FISHERIES AND FOOD

Food Additives and Contaminants Committee

REPORT ON FURTHER CLASSES OF FOOD ADDITIVES

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Food Additives and Contaminants Committee

The terms of reference of the Food Additives and Contaminants Committee are:

> "To advise the Minister of Agriculture, Fisheries and Food, the Secretary of State for Scotland, the Minister of Health, and as respects Northern Ireland, the Secretary of State for the Home Department, on matters referred to them by Ministers, in relation to food contaminants, additives and similar substances which are or may be present in food, or used in its preparation, with particular reference to the exercise of powers conferred on Ministers by Sections 4, 5 and 7 of the Food and Drugs Act, 1955 and the corresponding provisions in enactments relating to Scotland and Northern Ireland."

The members of the Food Additives and Contaminants Committee are:

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Joint Secretaries:

L. G. Hanson, Esq.
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Pharmacology sub-Committee

The terms of reference of the Pharmacology sub-Committee are:

> "To advise at the request of the Committee on Medical Aspects of Food Policy, The Food Additives and Contaminants Committee, The Ministry of Agriculture, Fisheries and Food, The Ministry of Health, The Scottish Home and Health Department, or The Ministry of Health and Social Services, Northern Ireland on the hazard to health, including toxicological and carcinogenic risks, resulting from the use or presence of additives or contaminants in or on food."

The members of the Pharmacology sub-Committee are:

Professor A. Kekwick, M.B., B.Ch., M.A., F.R.C.P. (*Chairman*)
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FOOD ADDITIVES AND CONTAMINANTS COMMITTEE

Report on the Review of Further Classes of Food Additives

Remit

1. The Food Standards Committee was asked in 1962 to consider those classes of additives which were neither the subject of control by regulations nor had been reviewed by the Committee. The Committee referred the question to its Food Additives and Contaminants sub-Committee. The sub-Committee concluded that the classes that would need to be considered in the review were pH regulators (acidifiers, bases and buffers), humectants, sequestrants, propellents, glazing agents, anti-foaming agents, anti-caking agents, release agents and firming or crisping agents.

2. The sub-Committee sought evidence from interested parties and, when this had been received, began its investigation of the problem. This was not completed by November 1964 when the sub-Committee was abolished and replaced by the present Committee which took over all the outstanding work. The initial studies which led to this report were therefore carried out by the sub-Committee and its Pharmacology Panel.

Classification

3. Many of the substances that are considered in this report could be classified, and were in fact submitted, under more than one of the headings we have used. If the recommendations contained in this and other of our reports are adopted, all classes of additives will ultimately be controlled by permitted lists and therefore the particular class in which an additive is permitted will be of no practical significance since when it is found in a food it will not normally be possible to establish the purpose for which it was added. We have in this report dealt with each substance which we think should be permitted under the first class in which it properly occurs. Certain classes may contain only a very small number of recommended substances because most of the others have previously been dealt with in another class. The Pharmacology sub-Committee have sometimes included a substance under a different class. Where necessary, we have made cross references in dealing with a class of additive. Substances which are already permitted for use in food by virtue of existing regulations have not been included. We should also make it clear that it is not our intention to restrict the use of ordinary foods, such as sugar and egg white as glazing agents, for the purposes dealt with in this report.

4. We think that in general, there is no need to lay down limits for the amount of the substances we propose to permit to occur in food. Where it is necessary for toxicological or other reasons we have recommended accordingly but in all cases we consider that it is essential to establish the principle that the amounts added to food should never be more than necessary to secure the intended technological effect. We recognise that it might not be possible to embody this principle in legislation but we wish to draw the attention of all concerned to the need to observe it in practice in all cases. This is especially important for baby foods and invalid foods.

Report of the Pharmacology sub-Committee

5. The report of the Pharmacology sub-Committee is at Appendix I. The Food Additives and Contaminants sub-Committee referred certain classes of additives

to the Pharmacology Panel in 1963 and the work was continued and completed by the Pharmacology sub-Committee. We consulted the Pharmacology sub-Committee about other classes of additives at a later stage.

6. The Pharmacology sub-Committee have in most cases classified substances into certain groups (Appendix I paragraph 4). Group A are additives which the available evidence suggests are acceptable for use in food. Group B are additives which the available evidence suggests may be regarded in the meantime as provisionally acceptable but about which further information is necessary and which must be reviewed within a specified period. *We recommend* that each of these substances in Group B should be again reviewed not later than five years after the making of regulations and that any substance for which satisfactory evidence has not been received by then should be withdrawn from the permitted list.

7. We agreed with the Pharmacology sub-Committee about the importance of specifications which are necessary in order to evaluate safety and to control the use of an additive. We consider that substances should only be permitted if they have suitable specifications. We have considered the specifications available in the British Pharmacopoeia, the British Pharmaceutical Codex, the appropriate British Standard and the Food Chemicals Codex and *we recommend* that the specifications in Appendix II should be laid down. For other substances for which no official specifications are available *we recommend* that they should be included in a permitted list only if specifications adequate for inclusion in the Regulations are made available by those wishing to use such substances.

Acids and Buffers

8. We have considered two groups of acids: those usually used as acidifiers and those mainly if not entirely used as flavouring agents.

9. We define acids as substances which in solution yield hydrogen ions as the sole positive ion. Those capable of imparting an acid taste to food are usually known as acidifiers. We consider that it would not be profitable to try to distinguish acids from buffers and we propose below a single permitted list for the two classes. We would define buffers used in food as substances, usually salts of weak acids or partial salts of polybasic acids, which are capable of combining with hydrogen ions or hydroxyl ions and therefore tend to keep the pH reasonably constant. We see no objection to sodium, potassium and calcium salts being permitted on the same basis as the parent acid.

10. We consider that, subject to suitable specifications of purity, the following acids and their sodium, potassium and calcium salts may be permitted for use in food:

Acetic acid	(Group A)
Citric acid	(Group A)
Fumaric acid	(Group A)
Lactic acid	(Group A)
Malic acid	(Group A)
Tartaric acid	(Group A)
Orthophosphoric acid	(Group A)
Pyrophosphoric acid	(Group A)
Pyruvic acid	(Group A)
Succinic acid	(Group A)

11. We also considered certain acids which were among those submitted by the Trade for consideration as flavouring agents. The following sixteen acids (all Group A)

Butyric acid
Capric acid
Caproic acid
Hex-2-enoic acid
Undecylenic acid
Lauric acid
Linoleic acid
Myristic acid
Caprylic acid
Crotonic acid
Heptoic acid
Valeric acid
Nonoic acid
Oleic acid
Palmitic acid
Stearic acid

fall within the group of the normal straight chain saturated fatty acids to C_{24} and naturally occurring ethenoid fatty acids to C_{24}. We note that the Pharmacology sub-Committee consider that all substances (excluding conjugated and cyclopropenoid fatty acids) in this group up to C_{24} may be used without limitation. *We therefore recommend* that these sixteen acids should be permitted without any limitation. Because of the views expressed by the Pharmacology sub-Committee on the other flavouring acids we consider that only

2-Ethylbutyric acid	(Group B)
α-Caprylbutyric acid	(Group B)
Isovaleric acid	(Group B)

should be permitted, but subject to a maximum limit of 50 ppm in food.

12. Provided that the acids listed in paragraphs 10 and 11 above, and the buffers derived from them, comply with the specifications laid down or referred to in Appendix II to this report, *we recommend* that they be allowed without limitation except for the three acids for which a limit of 50 ppm has been recommended. The sodium, potassium and calcium salts may be permitted on a similar basis.

13. In addition to orthophosphoric acid, we see no objection to the use of inorganic di-, poly-, and meta-phosphates (Group A).

14. We consider that benzoic acid and propionic acid should only be used in food as permitted by the Preservatives in Food Regulations, 1962. We are considering the use of formic acid in our review of those regulations.

15. We received representations in favour of permitting adipic acid, but we considered that the evidence of technological need and the toxicological information provided was not sufficient for us to recommend that its use be permitted. We have also considered the use of gluconic and heptonic acids and their salts and we do not think that these can be permitted unless they are the subject of long-term tests on properly specified substances. We are prepared, however, to agree that calcium gluconate and calcium heptonate (both Group A) may be permitted on the basis of experience of their use in medical practice and also of their well-known low toxicity which suggests that they would present no hazard to health. *We recommend* that calcium gluconate and calcium heptonate be permitted provided that the appropriate specifications in Appendix II are complied with. Acid sodium aluminium phosphate (Group A) is widely used in the United States of America and was submitted (together with gluconic and heptonic acids) as an improved alternative to the present "acid" components of self-raising powders. We can see no objection to the use of this particular substance and we *recommend* that it be permitted.

16. We have carefully considered the advice of the Pharmacology sub-Committee on the use of tartaric acid (Group A). The restriction suggested would pose great difficulties in practice and since tartaric acid has long been used as an acidulant in food and extensively in medical practice we consider it unnecessary to lay down limits for its use.

17. Sulphuric acid and hydrochloric acid (both Group A) are used as processing aids. We see no objection to such use provided that, as recommended by the Pharmacology sub-Committee, the acids are of appropriate specification and the selenium content of sulphuric acid is no higher than 20 ppm.

18. The addition of ascorbic acid (Group A) and nicotinic acid (Group A) to raw and unprocessed meat is forbidden by the Meat (Treatment) Regulations 1964. This ban was imposed to prevent deception of the consumer and also because the use of nicotinic acid caused 'flushing' in certain individuals. We have considered whether there should be any further control of the use of these acids and have concluded that this is not necessary except for an extension of the existing control to uncooked processed meat and meat products. *We recommend accordingly.*

19. We note that erythorbic acid which is also banned by the Meat (Treatment) Regulations 1964 is not a permitted antioxidant and may not therefore be used generally in food.

Bases

20. We define bases as substances yielding hydroxyl ions in solution which impart to water an alkaline reaction and which are capable of neutralising hydrogen ions with the formation of water and the corresponding salt. It is also convenient to include within this group various ammonium, calcium, magnesium, potassium and sodium salts of carbonic acid (the carbonates, sesquicarbonates and bicarbonates) which are also capable of neutralising hydrogen ions.

21. We consider that, subject to suitable specifications of purity, the following substances may be permitted for use in food except where their use is specifically prohibited by existing regulations:

Ammonium hydroxide	(Group A)
Calcium hydroxide (or oxide)	(Group A)
Magnesium hydroxide	(Group A)
Potassium hydroxide	(Group A)
Sodium hydroxide	(Group A)
Ammonium carbonate	(Group A)
Ammonium bicarbonate	(Group A)
Calcium carbonate	(Group A)
Magnesium carbonate	(Group A)
Potassium carbonate	(Group A)
Sodium carbonate	(Group A)
Sodium bicarbonate	(Group A)
Sodium sesquicarbonate	(Group A)

22. We do not recommend any quantitative limits for bases provided that use is in accordance with good manufacturing practice, but they must comply with the specifications laid down or referred to in Appendix II.

Humectants

23. We define humectants as substances, hygroscopic in nature, which are capable of offsetting wholly or partially the effect of changes in humidity in the atmosphere to which a food is exposed and of maintaining in a food an optimum amount of moisture.

24. The following substances were submitted to us as humectants: sorbitol (Group A), glycerol, propane-1, 2-diol, and sodium and potassium lactates.

Glycerol and propane-1, 2-diol are permitted by the Solvents in Food Regulations 1967. We have recommended above that sodium and potassium lactates should be included among permitted acidifiers and buffers. This only leaves sorbitol. We see no objection to the use of sorbitol in food and do not think that a quantitative limit should be laid down. The specification referred to in Appendix II must be complied with.

Sequestrants

25. We define sequestrants as substances which are capable of forming, with certain metallic ions, soluble, stable, un-ionised complexes and thus preventing effectively any deleterious activity which those cations might exert on the food.

26. We consider that glycine (Group A) should be permitted. We have carefully considered whether we should allow the use of sodium calcium edetate (calcium disodium ethylenediamine tetra-acetate dihydrate) (Group B) in view of the recommendation of the Pharmacology sub-Committee that total daily intake would have to be restricted to no more than 1·25 mg/kg bodyweight. We were told that the main uses would be in sauces and salad dressings, in canned, raw and peeled potatoes and in canned crustaceans, and that potential uses include soft drinks and margarine. There are more satisfactory substances in use for all these products with the exception of canned fish where sodium calcium edetate is effective in preventing struvite formation. We therefore *recommend* that it be permitted in canned fish and canned crustaceans. We do not think it necessary to specify a maximum limit as the amounts used in practice will be very small and the individual's consumption of these foods is low. Of the remaining substances placed in Groups A and B by the Pharmacology sub-Committee, citric acid, sodium citrate and calcium citrate are permitted under paragraph 10, calcium heptonate under paragraph 15, orthophosphoric acid under paragraph 10 and di-, poly- and meta-phosphates under paragraph 13.

Propellents

27. We define a propellent as any inert gas or low boiling point liquid which, when added to food in a suitable container, is capable of expelling the food from the container without the application of external pressure to the food.

28. The following substances should be permitted:

Carbon dioxide	(Group A)
Nitrogen	(Group A)
Nitrous oxide	(Group A)

Glazing Agents

29. We define glazing agents as substances which are capable of forming on the external surfaces of food a film which reflects light almost completely and thereby imparts a shiny appearance.

30. The following substances should be permitted subject to satisfactory specifications:

Acacia (Gum arabic)	(Group A)
Beeswax	(Group A)
Casein	(Group A)
Dextrin	(Group A)
Gelatin	(Group A)
Shellac	(Group A)
Spermaceti wax	(Group A)
Zein	(Group A)

We were told that Sandarac (Group B) is no longer used as a glazing agent.

31. The use of mineral oils and waxes for glazing sugar confectionery is already covered by the Mineral Hydrocarbons in Food Regulations 1966. These regulations permit the presence of mineral hydrocarbons which conform to the specifications of purity laid down in the regulations provided that the sugar confectionery does not contain more than 0·2 per cent by weight of mineral hydrocarbon. We do not think that benzoin (gum benzoin) (Group B) should be permitted as a glazing agent as it contains benzoic acid, the use of which is controlled by the Preservatives in Food Regulations 1962. As stated in paragraph 6 of Appendix I certain substances already dealt with in existing regulations were submitted as release agents.

Anti-foaming Agents

32. We define anti-foaming agents as substances capable of breaking a gas/liquid colloidal dispersion or of preventing its formation.

33. The following substances should be permitted:

Edible glyceride oils	(Group A)
Silicones as specified	(Group B)

Deodorised groundnut oil was the only edible glyceride oil submitted to us as an anti-foaming agent but we see no reason why all edible glyceride oils (many of which are natural food substances) should not be permitted. As stated in paragraph 6 of Appendix I, certain substances already covered by the Emulsifiers and Stabilisers in Food Regulations 1962 were submitted to us as anti-foaming agents. We see no reason why silicones should not be permitted provided that they comply with the specifications laid down in Appendix II. *We recommend* accordingly.

Anti-caking Agents

34. We define anti-caking agents as substances capable of reducing the tendency of individual particles of food to adhere to one another.

35. The following substances should be permitted:

Light magnesium carbonate	(Group A)
Magnesium oxide	(Group A)
Magnesium stearate	(Group A)
Calcium hydroxyphosphate	(Group A)
Bone phosphate of food grade	(Group A)
Silica and silicic acid	(Group A)
Magnesium trisilicate	(Group A)
Calcium silicate	(Group A)
Sodium aluminium silicate	(Group A)
Sodium calcium aluminium silicate	(Group A)
Calcium aluminium silicate	(Group A)

This list is intended to include natural clays such as bentonite, kaolin and sepiolite where these are specially prepared for use in food. Of the remaining substances placed in Group A by the Pharmacology sub-Committee, calcium phosphate and sodium pyrophosphate are permitted under paragraph 10.

36. We consider that there is a need to provide a limit to the total amount of anti-caking agent permitted in food in order to prevent misuse and *we recommend* that a maximum of 2 per cent by weight on a dry basis of the product be laid down. We recognise that enforcement difficulties may arise with the use of calcium phosphate and sodium pyrophosphate as anti-caking agents for the reason already generally referred to in paragraph 3; in this case it may not

always be possible to establish that these substances were being used as anti-caking agents.

Release Agents

37. We define release agents as substances which facilitate the ready separation of food from surfaces with which it may come in contact during manufacture or conveyance, e.g. belts, slabs, trays or utensils. We do not include substances or materials which form an integral part of machinery or conveyor belts or food containers or silicone resins baked on to baking tins.

38. Of the substances submitted to us as release agents and classified in group A by the Pharmacology sub-Committee we have recommended above that stearic acid (para. 11), calcium carbonate (para. 21), spermaceti (para. 30) and magnesium stearate (para. 35) be permitted. Glycerol is permitted by The Solvents in Food Regulations 1967. We see no objection to the use of sperm oil. The use of mineral oils and waxes is already covered by the Mineral Hydrocarbons in Food Regulations, 1966. These regulations permit in food, as a result of their use as a lubricant or greasing agent on a surface with which the food has necessarily come in contact during the course of preparation, the presence of mineral hydrocarbons, which conform to the specifications of purity laid down in the regulations, provided that the food does not contain more than 0·2 per cent by weight of mineral hydrocarbon.

Firming and Crisping Agents

39. We define firming and crisping agents as substances that are capable of preventing the onset of flaccidity or of maintaining turgidity in certain vegetable tissues.

40. All the substances mentioned under Group A in paragraph 17 of Appendix I are acceptable for use in food for this purpose, i.e. calcium chloride, sodium chloride, calcium hydroxide, calcium citrate, calcium lactate, calcium gluconate, calcium heptonate and calcium phosphate. Apart from sodium chloride and calcium chloride the remainder are already recommended under paragraphs 10, 15 and 21. Calcium metabisulphite was also submitted to us; its use is controlled by the Preservatives in Food Regulations, 1962.

Labelling

41. *We recommend* that any substance when sold for use in food should be labelled so as to indicate its chemical nature and to give a true description of any other substances present in the preparation.

Review

42. *We recommend* that any regulations made as a result of this report should be reviewed not more than five years after they are made.

Summary of Recommendations

43. (*a*) Substances placed in Group B by the Pharmacology sub-Committee should be reviewed not later than five years after the making of regulations and withdrawn from the permitted list unless satisfactory evidence for their retention has been received (paragraph 6).

(*b*) Specifications should be available for all substances included in a permitted list; where the appropriate specification is not included in this report a specification must be provided which is adequate for inclusion in regulations (paragraph 7 and Appendix II).

(*c*) The following acids and their sodium, potassium and calcium salts should be permitted for use in food:

Without limitation:

Acetic acid	(Group A)	Malic acid	(Group A)
Butyric acid	(Group A)	Myristic acid	(Group A)
Capric acid	(Group A)	Nonoic acid	(Group A)
Caproic acid	(Group A)	Oleic acid	(Group A)
Caprylic acid	(Group A)	Orthophosphoric acid	(Group A)
Citric acid	(Group A)	Palmitic acid	(Group A)
Crotonic acid	(Group A)	Pyrophosphoric acid	(Group A)
Fumaric acid	(Group A)	Pyruvic acid	(Group A)
Heptoic acid	(Group A)	Stearic acid	(Group A)
Hex-2-enoic acid	(Group A)	Succinic acid	(Group A)
Lactic acid	(Group A)	Tartaric acid	(Group A)
Lauric acid	(Group A)	Valeric acid	(Group A)
Linoleic acid	(Group A)	Undecylenic acid	(Group A)

Subject to a maximum of 50 *ppm:*

2-Ethylbutyric acid	(Group B)
α-Caprylbutyric acid	(Group B)
Isovaleric acid	(Group B) (Paragraphs 10, 11 and 12).

(*d*) Inorganic di-, poly- and meta-phosphates should be permitted (Group A) (paragraph 13).

(*e*) Calcium gluconate, calcium heptonate and acid sodium aluminium phosphate should be permitted (Group A) (paragraph 15).

(*f*) Sulphuric acid and hydrochloric acid (Group A) may be used as processing aids; the selenium content of sulphuric acid should be no higher than 20 ppm (paragraph 17).

(*g*) Ascorbic acid and nicotinic acid (Group A) may be used without limitation except where their use is specifically forbidden; the existing ban on their use in raw and unprocessed meat should be extended to uncooked processed meat and meat products (paragraph 18).

(*h*) The following bases should be permitted except where their use is specifically forbidden:

Ammonium hydroxide	(Group A)
Calcium hydroxide (or oxide)	(Group A)
Magnesium hydroxide	(Group A)
Potassium hydroxide	(Group A)
Sodium hydroxide	(Group A)
Ammonium carbonate	(Group A)
Ammonium bicarbonate	(Group A)
Calcium carbonate	(Group A)
Magnesium carbonate	(Group A)
Potassium carbonate	(Group A)
Sodium carbonate	(Group A)
Sodium bicarbonate	(Group A)
Sodium sesquicarbonate	(Group A) (Paragraph 21).

(*i*) The following humectant should be permitted:

Sorbitol (Group A) (paragraph 24).

(*j*) The following sequestrants should be permitted:

Glycine (Group A)
Sodium calcium edetate (Group B) — in canned fish including canned crustaceans (paragraph 26).

(*k*) The following propellents should be permitted:

Carbon dioxide	(Group A)
Nitrogen	(Group A)
Nitrous Oxide	(Group A) (Paragraph 28).

(*l*) The following glazing agents should be permitted:

Acacia (Gum arabic)	(Group A)
Beeswax	(Group A)
Casein	(Group A)
Dextrin	(Group A)
Gelatin	(Group A)
Shellac	(Group A)
Spermaceti wax	(Group A)
Zein	(Group A) (Paragraph 30).

(*m*) The following anti-foaming agents should be permitted:

Edible glyceride oils	(Group A)
Silicones as specified	(Group B) (paragraph 33).

(*n*) The following anti-caking agents should be permitted subject to a maximum of 2 per cent by weight on a dry basis:

Light magnesium carbonate	(Group A)
Magnesium oxide	(Group A)
Magnesium stearate	(Group A)
Calcium hydroxyphosphate	(Group A)
Bone phosphate of food grade	(Group A)
Silica and silicic acid	(Group A)
Magnesium trisilicate	(Group A)
Calcium silicate	(Group A)
Sodium aluminium silicate	(Group A)
Sodium calcium aluminium silicate	(Group A)
Calcium aluminium silicate	(Group A)
Bentonite	(Group A)
Kaolin	(Group A)
Sepiolite	(Group A) (Paragraphs) 35 & 36).

(*o*) The following release agent should be permitted:

Sperm oil (Group A) (Paragraph 38).

(*p*) The following firming and crisping agents should be permitted:

Sodium chloride	(Group A)
Calcium chloride	(Group A) (Paragraph 40).

(*q*) Each of the permitted substances when sold for use in food should be labelled so as to indicate its chemical nature and to give a true description of any other substances present in the preparation. (Paragraph 41).

(*r*) Regulations made as a result of this report should be reviewed not more than five years after making (Paragraph 42).

January 1968

FAC/REP/7

APPENDIX 1

Committee on Medical Aspects of Food Policy

PHARMACOLOGY SUB-COMMITTEE

Report on Further Classes of Food Additives

Introduction

1. In June 1963, the Food Additives and Contaminants sub-Committee agreed that control of the further classes of food additives should be by means of a permitted list and therefore referred the following seven classes of additives to the Pharmacology Panel:

SEQUESTRANTS
PROPELLENTS
GLAZING AGENTS
ANTI-FOAMING AGENTS
ANTI-CAKING AGENTS
RELEASE AGENTS
FIRMING OR CRISPING AGENTS

In January 1965, the Food Additives and Contaminants Committee asked us to continue this study and in 1966 referred to us pH REGULATORS (ACIDS, BASES and BUFFERS) and HUMECTANTS.

General Observations

2. In response to the press notice issued in June 1962 announcing the review of further classes of food additives, little information on toxicity was submitted by the Trade and the Trade asserted that the use of most of the specified substances was traditional and that they were generally regarded as safe. We were advised that the British Industrial Biological Research Association (BIBRA) would assist in compiling relevant evidence on toxicology and they were able to provide a detailed submission on the sequestrants sodium calcium edetate and sodium edetate.

3. Information on the composition or purity of the additives as used in food was either lacking or inadequate. Suitability for use in food can only be adequately assessed if the results of toxicity studies can be related to products of defined and commercially reproducible composition. Only those additives which can be prepared to fulfil a detailed specification should be permitted. Some specifications were provided and have been noted under our DETAILED OBSERVATIONS (paragraphs 7 to 17 below). We would also draw attention to the monographs published in the Food Chemicals Codex[1] and to the specifications for the identity and purity of emulsifiers and stabilisers contained in the Seventh and Ninth Reports of the Joint FAO/WHO Expert Committee on Food Additives[2] [3].

Classification

4. In the circumstances we found that of the six headings* which we use when classifying the acceptability of food additives, only Groups A, B, D and E were applicable.

**Group A:* Additives that the available evidence suggests are acceptable for use in food.

**Group B:* Additives that on the available evidence may be regarded meanwhile as provisionally acceptable for use in food, but about which further information is necessary and which must be reviewed within a specified time.

**Group C:* Additives for which the available evidence suggests possible toxicity and which ought not to be allowed in food without evidence establishing their acceptability.

**Group D:* Additives for which the available evidence suggests probable toxicity and which ought not to be allowed in food.

**Group E:* Additives for which the available evidence was inadequate to enable an opinion to be expressed as to their suitability for use in food.

**Group F:* Additives for which no information on toxicity was available.

5. The allocation below of most of the substances to Group A is seldom based on information from toxicological tests on animals. In some instances the metabolism in man is known; in others there is evidence of long use in medicine or in food. Where definite toxicological information was available it was noted in our DETAILED OBSERVATIONS (paragraphs 7 to 17 below) and we have assumed that the additives concerned would have been of food grade quality.

6. We did not consider it necessary to classify substances already subject to Regulations under the Food and Drugs Act 1955, namely:

PH REGULATORS (ACIDS): Benzoic acid, propionic acid, formic acid and erythorbic acid.

GLAZING AGENTS: Acetylated mono- and di-glycerides; sorbitan monostearate, mineral oils and petroleum jelly.

ANTI-FOAMING AGENTS: Glyceryl monostearate, sorbitan monolaurate, sorbitan esters of fatty acids.

RELEASE AGENTS: Mineral oils and waxes, acetylated mono- and di-glycerides.

FIRMING OR CRISPING AGENTS: Calcium metabisulphite.

Detailed Observations

7. PH REGULATORS

ACIDS

Group A

(i) *Acetic acid, citric acid, fumaric acid*[3], *pyruvic acid, succinic acid.*

(ii) *Lactic acid, malic acid, tartaric acid, orthophosphoric acid, pyrophosphoric acid, polyphosphoric acid, normal straight-chain saturated fatty acids to* C_{24} and *naturally occurring ethenoid fatty acids to* C_{24} *(butyric, capric, caproic, caprylic, undecylenic, lauric, linoleic, myristic, valeric, crotonic, hex-2-enoic, heptoic, nonoic, oleic, palmitic, stearic).*

Although there is a reference in the Ninth Report of the Joint FAO/WHO Expert Committee on Food Additives[3] to the relative indigestibility of the D(-) isomers of lactic and malic acids by infants, we do not consider that this is a significant problem in the United Kingdom. We have no information to suggest that the use without limitation of lactic and malic acids for acidifying purposes would be harmful.

The Joint FAO/WHO Expert Committee recommended an unconditional Acceptable Daily Intake (ADI) of 0–6 mg/kg body weight for tartaric acid and a conditional ADI of 6–20 mg/kg body weight[4]. There is a considerable intake of this acid from natural sources and unlimited additional use of tartaric acid as an acidulant might lead to intakes above the recommended figures. After consideration of the toxicological evidence on tartaric acid we *recommend* that the daily intake over that derived from natural sources should not exceed 20 mg/kg body weight per day. We also considered the total dietary intake in the United

Kingdom of all types of phosphates. The data provided did not support the view that the present dietary load of phosphates was excessive and showed that dietary intakes were below the limit for ADI's in man stated in the Seventh and Eighth Reports of the Joint FAO/WHO Expert Committee on Food Additives[2 4].

Diphosphates, polyphosphates and metaphosphates behave metabolically as orthophosphates. Certain studies state that the administration to rats of pyrophosphate at a level of 1 per cent or more in the diet or of orthophosphate at a level of 5 per cent resulted in demonstrable changes in the kidneys which showed reduced functional efficiency and increased relative weight[2 5].

The acids originally submitted by the Trade as flavouring agents were given special consideration. Although there is little formal toxicological information available about the sixteen acids listed as falling within the group of normal straight-chain saturated fatty acids up to C_{24} and naturally occurring ethenoid fatty acids up to C_{24}, there is well-founded general knowledge of their metabolic fate. On this basis and the fact that their use for flavouring purposes is self-limiting, we think that prescribed limits for use are not necessary.

(iii) *Acid sodium aluminium phosphate.* This substance has been used for many years as a leavening ingredient for self-raising flour in the United States of America. The principle residue after reaction with the carbon dioxide producing moiety is stated to be a complex insoluble basic phosphate. Although the toxicological information available is scanty[6], there is no indication that the use of this acidifier is hazardous provided our recommendations in para. 17 on aluminium salts in food is borne in mind.

(iv) *Sulphuric acid, hydrochloric acid.* We understand that these acids are used as processing agents. We consider it essential that the materials used should conform to food grade specification and that the selenium content of sulphuric acid should not exceed 20 ppm as stipulated in the Food Chemicals Codex[1].

(v) *Ascorbic acid, nicotinic acid.*

Group B

(i) *2-Ethylbutyric acid, α-caprylbutyric acid, isovaleric acid.* These acids were originally submitted as flavouring agents but there are insufficient data available to warrant their use in food without limitation for that purpose. Moreover, branched-chain fatty acids are not necessarily metabolised like straight-chain fatty acids and exert preservative properties in higher concentrations. We *recommend* that their use should be limited to a maximum of 50 ppm in foods to which they are added.

Group D

(i) *Maleic acid.* This acid is known to exert a toxic effect on the renal tract and should not be allowed as a food additive[7].

(ii) *Tannic acid.* Certain tannic acids are hepatotoxic[8] but others occurring in natural foodstuffs such as tea and coffee are not toxic. We understand it would be extremely difficult to distinguish these variants from among the commercially available materials which would be used as acidifiers. *We recommend* therefore that commercial tannic acid should not be used in food.

(iii) *Gallic acid.* Some gallates are known to be hepatotoxic in large doses[9]. These acids also chelate with iron and calcium in the diet. Although certain gallates are permitted as antioxidants in limited amounts in certain classes of food *we do not recommend* the use of gallic acid as an acidifier.

Group E

(i) *Phenylacetic acid, pyroligneous acid, heptonic acid, gluconic acid*[10]. The toxicological information available was inadequate for assessment. For heptonic acid see para. 11 Group E(iii). For gluconic acid see para. 17 Group A(i). Gluconodeltalactone, a tautomeric form of gluconic acid, has been assessed by the Joint FAO/WHO Expert Committee[3] on metabolic evidence alone. Nevertheless, in the absence of long-term studies we have classified this compound as falling into group E when intended for use as an acidifier.

8. PH REGULATORS

BASES

Group A

(i) *Ammonium hydroxide, calcium hydroxide (or oxide), magnesium hydroxide, potassium hydroxide, sodium hydroxide, ammonium carbonate, ammonium bicarbonate, calcium carbonate, magnesium carbonate, potassium carbonate, sodium carbonate, sodium bicarbonate, sodium sesquicarbonate.*

Provided there are suitable specifications to which these substances can conform and that their use is in accordance with good manufacturing practice, *we recommend* that they may be used without limitation in food.

9. PH REGULATORS

BUFFERS

Group A

(i) *Sodium, potassium and calcium salts of all acids listed in Groups A and B.* We have no objection to the use of these salts in food without limitation provided that their use is in accordance with good manufacturing practice.

10. HUMECTANTS

Group A

(i) *Sorbitol.*

11. SEQUESTRANTS

Group A

(i) *Citric acid, sodium citrate, calcium citrate, calcium heptonate.*

(ii) *Glycine.*

(iii) *Orthophosphoric acid, calcium orthophosphates, sodium pyrophosphates, sodium hexametaphosphate.* Phosphoric acid and the phosphates are acceptable as sequestrants. See comments para. 7(ii).

Group B

(i) *Sodium calcium edetate.* This substance is dealt with in a monograph in the British Pharmaceutical Codex (BPC) 1963, and in the Ninth Report of the Joint FAO/WHO Expert Committee on Food Additives[3]. Two-year feeding studies in rats and one-year feeding studies in dogs with a product of known specification showed no significant deviations from normal physiological responses nor any evidence of interference with nutritional mineral metabolism in either species at levels of sodium calcium edetate up to 250 mg/kg body weight[11]. A detailed survey of the applications and physiological effects of salts of ethylenediamine tetraacetic acid by BIBRA and data from WHO were provided for assessment. Wide clinical experience in the treatment of metal poisoning has demonstrated its safety in man under short-term conditions of use. We think that sodium calcium edetate is acceptable for use as a sequestrant if limits are set to the amounts permissible in individual foods and if the ADI's for man fall within the range of 0–1·25 mg/kg bodyweight as stated in the Ninth Report of the Joint FAO/WHO Expert Committee on Food Additives[3]. Long-term tests on a second animal species are desirable.

Group D

(i) *Sodium edetate.* There is a specification in the BPC 1963 and in the Ninth Report of the Joint FAO/WHO Expert Committee on Food Additives[3]. Because of its effect on calcium ions the general use of sodium edetate as a food additive is not recommended unless used solely for accurate complexing of calcium ions. If so used no excess of sodium edetate must remain and the only compound finally present should be sodium calcium edetate.

Group E

(i) *Stearyl citrate, isopropyl citrate.*

(ii) *Calcium phytate.*

(iii) *Heptonic acid* (including its sodium and potassium salts). Calcium heptonate is included in Group A because of its clinical use.

(iv) *Metatartaric acid.* This is stated to be obtained by heating d-tartaric acid to 170°C under reduced pressure. Its composition is unknown but a specification is given in the International Wine Codex[12]. In wine the acid is stated to be slowly transformed to tartaric acid, but metatartaric acid will in practice be present in wine as consumed. The toxicological information was inadequate.

12. PROPELLENTS

Group A

(i) *Carbon dioxide, nitrogen.*

(ii) *Nitrous oxide*[13]. There is sufficient information about nitrous oxide and experience of its use as an anaesthetic to place it in Group A as a propellent.

Group E

(i) *Octafluorocyclobutane.* Inhalation studies have been carried out on a product of known specification[14]. The substance is slightly soluble in edible oil[15] and we require information from feeding tests to supplement results from inhalation studies.

(ii) *Chlorofluorohydrocarbons*, e.g. chloropentafluoroethane. Information is required on the composition of the products, their chemical stability under conditions of use and their toxicology.

13. GLAZING AGENTS

Group A

(i) *Casein, dextrin, gelatin, zein, animal albumen*—subject to satisfactory standards, especially to ensure freedom from bacteriological hazard.

(ii) *Beeswax.*

(iii) *Gum arabic* (syn. Gum acacia).

(iv) *Spermaceti wax.*

(v) *Shellac.*

Group B

(i) *Gum benzoin, gum sandarac.* Information is required on the composition of their commercial preparations and method of use.

Group E

(i) *Carnauba wax.*

14. ANTI-FOAMING AGENTS

Group A

(i) *Sodium stearate.*

(ii) *Deodorised groundnut oil*—(free from aflatoxin).

Group B

(i) *Silicones.* (DC Antifoam A and MS Antifoam A).[16 17 18 19 20] The specifications that were available for these substances fell short of ideal. Long-term tests have been carried out on one species only. Work on another species was considered desirable but not of high priority.

Group E

(i) *Silicones* (Silicolapse 436 Antifoam, Antifoam M432[21] and New MS 200 Polymer). The toxicological information provided was inadequate.

15. ANTI-CAKING AGENTS

Group A

(i) *Light magnesium carbonate, magnesium oxide.*

(ii) *Magnesium stearate, calcium hydroxyphosphate, calcium phosphate, bone phosphate of food grade.*

(iii) *Sodium pyrophosphate.*

(iv) *Silica and silicic acid, magnesium trisilicate, calcium silicate.*

(v) *Sodium aluminium silicate, sodium calcium aluminium silicate, calcium aluminium silicate, kaolin, bentonite, sepiolite.*
The specifications provided for the silicates were sufficient to ensure that commercially available materials had reproducible properties but were not restricted to single chemical entities. The toxicological evidence available was not entirely satisfactory especially in view of the absence of long-term studies. However, the ubiquitous occurrence of these compounds in the environment and many years experience of their medicinal use allow their inclusion in this group. These substances when used as food additives must be of British Pharmacopoeia (BP), BPC, or equivalent standard to exclude the risk of contamination with asbestos.

Group E

(i) *Disodium methylene bis(napthalene-β-sulphonate).* Some information on composition was supplied and the statement made that tests on rats have shown that the substance is not of high toxicity[21].

(ii) *Sodium ferrocyanide, potassium ferrocyanide.*

(iii) *Octadecylamine acetate.* A 120-day feeding test on rats had been made[21] but for its application to a staple food such as bread, fuller information about composition and purity together with results from long-term studies in two animal species are required. We suggest that the use of octadecylamine acetate as an anti-caking agent be considered with the use of octadecylamine as a boiler-water additive under the Food Additives and Contaminants Committee's review of emulsifiers.

(iv) *Magnesium silicate* (unspecified).

16. RELEASE AGENTS

Group A

(i) *Glycerol, edible oils, soya flour, calcium carbonate.*

(ii) *Stearic acid, magnesium stearate.*

(iii) *Sperm oil, spermaceti, beeswax.*

Group E

(i) *Butyl stearate, talc.* Talc if acceptable as a food additive must comply with BP, BPC, or equivalent standard to exclude the risk of contamination with asbestos.

(ii) *Natural waxes, vegetable oil emulsions, stearine.*
More detailed information of their composition is required.

(iii) *Silicone release agents and resin coatings (emulsions of polydimethylsiloxane fluids, silicone greases or compounds of polydimethylsiloxane fluids, curable polydimethylsiloxanes or silicone resins, DC 2102, DC 993 and Midland Silicones Pan Glaze, DC Pan Glaze) of unspecified composition.*
Only results of acute toxicity and of short-term studies on rats, rabbits and dogs were available[16 17 18 19 20 21]. A wide variety of silicones could be applied in practice. More information is required on the possibility of stipulating specifications for these compounds. The toxicological information provided is inadequate and in particular long-term feeding studies are required including studies on material subjected to repeated heating under conditions found in practice. We think it may also be important to study the solvents used to apply resin coatings.

(iv) *Fluorocarbon release agents.*

17. FIRMING OR CRISPING AGENTS

Group A

(i) *Calcium chloride, sodium chloride, calcium hydroxide, calcium citrate, calcium lactate, calcium gluconate, calcium heptonate.*
Calcium gluconate is included in Group A because of the extensive experience of its clinical use.

(ii) *Calcium phosphates.*

Group E

(i) *Potassium aluminium sulphate.*
We think this would need to be studied as part of a wider review of the use of aluminium salts in food.

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Secretariat

Ministry of Health
Alexander Fleming House
Elephant and Castle, S.E.1
December 1967
A/C 297/8

Column 1	Column 2	Column 3	Column 4
Common Name of Additive	Scientific (Systematic) Name	Official Specification (*See Notes*)	Other Requirements
1. Glacial acetic acid	Acetic acid	BPC p.6	—
2. Sodium acetate	Sodium acetate, hydrated	BP p.966	Not less than 98·0 per cent hy weight CH_3COONa after drying to constant weight at 105°C. Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
3. Sodium acetate, anhydrous	Sodium acetate	BP p.966	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
4. Potassium acetate	Potassium acetate	BP p.955	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
5. Calcium acetate	Calcium acetate	FCC p.100	Shall contain not more than 2 ppm arsenic.
6. Butyric acid	Butanoic acid	FCC p.97	Shall contain not more than 2 ppm arsenic.
7. Capric acid	Decanoic acid	FCC p.148	Shall contain not more than 2 ppm arsenic.
8. Caproic acid	Hexanoic acid	FCC p.149	Shall contain not more than 2 ppm arsenic.
9. Caprylic acid	Octanoic acid	FCC p.150	Shall contain not more than 2 ppm arsenic.
10. Citric acid	Citric acid, hydrated	BP p.183	—
11. Citric acid, anhydrous	Citric acid	BP p.184	—
12. Sodium citrate	Sodium citrate, hydrated	BP p.745	—
13. Potassium citrate	Potassium citrate	BP p.633	—
14. Calcium citrate	Calcium citrate, hydrated	FCC p.110	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.

15. Crotonic acid	But-2-enoic acid	N/A	—
16. Fumaric acid	*trans*-1,2-Ethylenedicarboxylic acid	FCC p.290	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
17. Sodium fumarate	Sodium *trans*-1,2-ethylenedicarboxylate	N/A	—
18. Potassium fumarate	Potassium *trans*-1,2-ethylenedicarboxylate	N/A	—
19. Calcium fumarate	Calcium *trans*-1,2-ethylenedicarboxylate	N/A	—
20. Heptoic acid	Heptanoic acid	N/A	—
21. Hex-2-enoic acid	Hex-2-enoic acid	N/A	—
22. Lactic acid	2-Hydroxypropionic acid	BP p.434	The material shall consist of either the DL form, or the L(+) form shall predominate.
23. Sodium lactate	Sodium 2-hydroxypropionate	N/A	—
24. Potassium lactate	Potassium 2-hydroxypropionate	N/A	—
25. Calcium lactate	Calcium di-2-hydroxypropionate pentahydrate	BP p.125	—
26. Lauric acid	Dodecanoic acid	FCC p.370	Shall contain not more than 2 ppm arsenic.
27. Linoleic acid	9,12-Octadecadienoic acid	N/A	—
28. Malic acid	DL-Hydroxysuccinic acid	FCC p.411	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
29. Sodium malate	Sodium hydroxysuccinate	N/A	—
30. Potassium malate	Potassium hydroxysuccinate	N/A	—
31. Calcium malate	Calcium hydroxysuccinate	N/A	—

Column 1	Column 2	Column 3	Column 4
Common Name of Additive	Scientific (Systematic) Name	Official Specification (*See Notes*)	Other Requirements
32. Myristic acid	Tetradecanoic acid	FCC p.456	Shall contain not more than 2 ppm arsenic.
33. Nonoic acid	Nonanoic acid	N/A	—
34. Oleic acid	*cis*-9-Octadecenoic acid	FCC p.477	Shall contain not more than 2 ppm arsenic.
35. Phosphoric acid	Orthophosphoric acid	BP p.609	Shall contain not more than 5 ppm fluorine.
36. Sodium phosphate	Monosodium dihydrogen orthophosphate	FCC p.634	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.
37. Sodium phosphate, dibasic	Disodium monohydrogen orthophosphate	FCC p.632	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.
38. Sodium phosphate, tribasic	Trisodium orthophosphate	FCC p.635	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.
39. Potassium phosphate, monobasic	Potassium dihydrogen orthophosphate	FCC p.551	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.
40. Potassium phosphate, dibasic	Dipotassium monohydrogen orthophosphate	FCC p.549	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.
41. Potassium phosphate, tribasic	Tripotassium orthophosphate	FCC p.552	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.

42. Calcium phosphate, monobasic (Acid calcium phosphate)	Calcium tetrahydrogen diorthophosphate	FCC p.133	Shall contain not more than 4 ppm arsenic, 5 ppm lead; nor more than 30 ppm fluorine.
43. Calcium phosphate, dibasic ..	Calcium hydrogen orthophosphate	FCC p.131	Shall contain not more than 4 ppm arsenic, 5 ppm lead; nor more than 30 ppm fluorine.
44. Calcium phosphate, tribasic ..	Tricalcium diorthophosphate ..	FCC p.135	Shall contain not more than 4 ppm arsenic, 5 ppm lead; nor more than 30 ppm fluorine.
45. Palmitic acid	Hexadecanoic acid	FCC p.487	Shall contain not more than 2 ppm arsenic.
46. Pyrophosphoric acid	Pyrophosphoric acid..	N/A	—
47. Sodium acid pyrophosphate ..	Disodium dihydrogen pyrophosphate	FCC p.599	Shall contain not more than 2 ppm arsenic, 5 ppm lead; nor more thao 5 ppm fluorine.
48. Sodium pyrophosphate	Tetrasodium pyrophosphate ..	FCC p.639	Shall contain not more than 2 ppm arsenic, 5 ppm lead; nor more than 5 ppm fluorine.
49. Potassium pyrophosphate ..	Tetrapotassium pyrophosphate ..	FCC p.555	Shall contain not more than 2 ppm arsenic, 5 ppm lead; nor more than 5 ppm fluorine.
50. Calcium pyrophosphate	Calcium pyrophosphate	FCC p.138	Shall contain not more than 2 ppm arsenic, 5ppm lead; nor more than 30 ppm fluorine.
51. Pyruvic acid	Pyruvic acid	N/A	—
52. Sodium, potassium and calcium pyruvates	Sodium, potassium and calcium pyruvates	N/A	—
53. Stearic acid	Octadecanoic acid	FCC p.665	Shall contain not more than 2 ppm arsenic.
54. Succinic acid	1,4-Butanedioic acid..	FCC p.669	Shall contain not more than 2 ppm arseoic nor more than 10 ppm lead.
55. Sodium, potassium and calcium succinates	Sodium, potassium and calcium succinates	N/A	—

Column 1	Column 2	Column 3	Column 4
Common Name of Additive	Scientific (Systematic) Name	Official Specification (*See Notes*)	Other Requirements
56. Tartaric acid	1,2-Dihydroxyethanedicarboxylic acid	BP p.811	The material shall consist of either the DL form or the L(+) form shall predominate.
57. Potassium acid tartrate (Cream of Tartar)	Monopotassium 1,2-dihydroxyethanedicarboxylate	BPC p.638	—
58. Sodium potassium tartrate (Rochelle Salt)	Sodium potassium 1,2-dihydroxyethanedicarboxylate tetrahydrate	BPC p.762	—
59. Valeric acid	Pentanoic acid	N/A	—
60. Undecylenic acid	Undec-10-enoic acid	BP p.865	Shall contain not more than 2 ppm arsenic nor more than 2 ppm lead.
61. 2-Ethylbutyric acid	2-Ethylbutyric acid	N/A	—
62. α-Caprylbutyric acid	2-Decanoylbutyric acid	N/A	—
63. Isovaleric acid	3-Methylbutanoic acid	FCC p.357	—
64. Sodium tripolyphosphate	Pentasodium triphosphate	FCC p.651	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.
65. Potassium polymetaphosphate (Potassium metaphosphate)	Potassium polymetaphosphate	FCC p.554	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.
66. Sodium metaphosphate	Sodium polyphosphate Sodium hexametaphosphate Sodium tetraphosphate Sodium trimetaphosphate Sodium tetrametaphosphate	FCC p.628	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 5 ppm fluorine.
67. Calcium gluconate	Calcium digluconate monohydrate	BP p.122	—

68. Calcium heptonate	Calcium heptonate	N/A	—
69. Acid sodium aluminium phosphate	Sodium aluminium phosphate tetrahydrate	FCC p.602	Shall contain not more than 2 ppm arsenic, 10 ppm lead; nor more than 20 ppm fluorine.
70. Sulphuric acid	Sulphuric acid	BPC p.815	Shall contain not more than 20 ppm selenium.
71. Hydrochloric acid	Hydrochloric acid	BP p.366	—
72. L-Ascorbic acid	3-Oxo-L-gulofuranolactone	BP p.62	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
73. Sodium ascorbate	Sodium-L-ascorbate	FCC p.603	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
74. Nicotinic acid	3-Pyridinecarboxylic acid	BP p.521	Shall contain not more than 2 ppm arsenic.
75. Ammonium hydroxide (Ammonia solution, strong)	Ammonium hydroxide	BP p.898	Shall contain not more than 5 ppm lead.
76. Calcium hydroxide	Calcium hydroxide	BP p.124	—
77. Calcium oxide	Calcium oxide	FCC p.124	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
78. Magnesium hydroxide	Magnesium hydroxide	BPC p.443	—
79. Potassium hydroxide	Potassium hydroxide	BP p.634	—
80. Sodium hydroxide	Sodium hydroxide	BP p.749	—
81. Ammonium carbonate	Ammonium carbonate	FCC p.37	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
82. Ammonium bicarbonate	Ammonium bicarbonate	BPC p.34	—
83. Calcium carbonate	Calcium carbonate	BP p.120	—
84. Chalk	Native calcium carbonate	BP p.150	—

Column 1	Column 2	Column 3	Column 4
Common Name of Additive	Scientific (Systematic) Name	Official Specification (*See Notes*)	Other Requirements
85. Heavy magnesium carbonate	Magnesium carbonate	BP p.451	Shall contain between 40 and 45 per cent by weight MgO.
86. Light magnesium carbonate	Magnesium carbonate	BP p.451	Shall contain between 40 and 45 per cent by weight MgO.
87. Potassium carbonate	Potassium carbonate	BP p.957	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
88. Sodium carbonate	Sodium carbonate decahydrate	BPC p.738	—
89. Anhydrous sodium carbonate	Sodium carbonate	BPC p.739	—
90. Sodium bicarbonate	Sodium bicarbonate	BP p.735	—
91. Sodium sesquicarbonate	Sodium sesquicarbonate dihydrate	FCC p.642	Shall contain not more than 2 ppm arsenic.
92. Sorbitol	1,2,3,4,5,6-Hexanebexol	FCC p.658	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
93. Glycine	Aminoacetic acid	FCC p.313	Shall contain not more than 2 ppm arsenic.
94. Sodium calciumedetate	Calcium chelate of disodium ethylenediamine-NNN'N'-tetraacetate dihydrate	BP p.738 and Addendum 1964, p.61	Shall contain not more than 2 ppm arsenic.
95. Carbon dioxide	Carbon dioxide	BS 1405 : 1967	—
96. Nitrogen	Nitrogen	N/A	—
97. Nitrous oxide	Nitrous oxide	Amendment to BP p.525 published July, 1967	—

98. Acacia (Gum arabic)	Gum acacia	BP p.11	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
99. Beeswax, white	White beeswax	FCC p.65	Shall contain not more than 2 ppm arsenic.
100. Beeswax, yellow	Yellow beeswax	FCC p.67	Shall contain not more than 2 ppm arsenic.
101. Casein, purified	Casein	N/A	—
102. Dextrin	Dextrin	N/A	—
103. Gelatin	Gelatin	BP p.337	—
104. Shellac	Shellac	BPC p.720	—
105. Spermaceti wax	Spermaceti	BPC p.771	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
106. Zein	Zein	N/A	—
107. Edible glyceride oils	Edible glyceride oils	—	Standards consistent with good manufacturing practice.
108. Dimethyl silicone	Dimethylpolysiloxane	FCC p.236	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead. Shall comply with the Identification tests and the Acidity test, for Dimethicone (B.P.C. 1963, p.268).
109. Magnesium oxide	Magnesium oxide	FCC p.400	Shall contain not more than 2 ppm arsenic.
110. Magnesium stearate	Magnesium stearate	BP p.454	Shall contain not more than 2 ppm arsenic.
111. Calcium hydroxyphosphate	Calcium hydroxyphosphate	N/A	—
112. Bone phosphate of Food Grade	—	N/A	—
113. Silica and Silicic acid	Silicon dioxide and Hydrated silica	FCC p.595	Shall contain not more than 2 ppm arsenic.

Column 1	Column 2	Column 3	Column 4
Common Name of Additive	Scientific (Systematic) Name	Official Specification (*See Notes*)	Other Requirements
114. Magnesium trisilicate	Magnesium trisilicate	BP p.455 and Addendum 1964, p. xvi	—
115. Calcium silicate	Calcium silicate	FCC p.141	Shall contain not more than 2 ppm arsenic.
116. Sodium aluminium silicate	Sodium aluminium silicate	FCC p.643	Shall contain not more than 2 ppm arsenic nor more than 10 ppm lead.
117. Calcium aluminium silicate	Calcium aluminium silicate	N/A	—
118. Bentonite	Native colloidal hydrated aluminium silicate	BP p.84	Shall contain not more than 10 ppm lead.
119. Heavy kaolin	Native hydrated aluminium silicate	BP p.432	—
120. Light kaolin	Native hydrated aluminium silicate	BP p.433	—
121. Sepiolite	Hydrated magnesium silicate	N/A	—
122. Sperm oil	Sperm oil	N/A	—
123. Sodium chloride	Sodium chloride	BP p.741	—
124. Calcium chloride	Hydrated calcium chloride	BP p.121	—

Notes:—(1) BP = British Pharmacopoeia, 1963; (2) BPC = British Pharmaceutical Codex, 1963; (3) FCC = Food Chemicals Codex, 1966, as amended 1967; (4) BS = British Standard; (5) N/A = Suitable official specification not available (see paragraph 7 of the Report).

APPENDIX III

Information and/or representations oral or written have been received from the following organisations and other interests concerned with the use of Further Classes of Food Additives:

Albright and Wilson (M.F.G.) Limited
Bowmans Chemicals Limited
British Baking Industries Research Association
British Essence Manufacturing Association and the Flavouring Compound Manufacturers Association
British Food Manufacturing Industries Research Association
British Industrial Biological Research Association
British Soft Drinks Council
Brown and Forth Limited
Cocoa, Chocolate and Confectionery Alliance
J. and J. Colman Limited
Du Pont Company (United Kingdom) Limited
English Co-operative Wholesale Society
Norman Evans and Rais Limited
Firmenich Limited
Flour Milling and Baking Research Association
Food Manufacturers Federation Incorporated
Imperial Chemical Industries Limited
Macphie and Co. (Produce) Limited
Metal Box Co. Limited
Midland Silicones Limited
Monsanto Chemicals Limited
National Association of British Wine Producers
National Association of Cider Makers
Chas. Page and Co. Ltd., as distributors for the Victor Chemical Works, Illinois, U.S.A.
Pfizer Limited
Rocol Limited
Sausage Manufacturers Association
Scottish Co-operative Wholesale Society
V.P. Vine Products Limited

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